NG-NetMS Rel 3.4
User Install documentation

System requirements

Stand alone workstation (recommended for high performance)

- **Processor:** 2.5 gigahertz (GHz) or faster
- **RAM:** 16 gigabyte (GB)
- **Hard disk space:** SSD - 2x 256MB (RAID1); HD 3x 1TB (RAID5)
- **Graphics card:** NVIDIA
- **Monitor:** multiple, with recommended resolutions 1920x1080

Cloud based VM (minimum recommended configuration)

- **Processor:** 4 virtual cores or more
- **RAM:** 4 Gigabytes (GB)
- **Hard disk space:** 20 GB
- **Graphics card:** n/a
- **Monitor:** recommended resolution 1280x800

Pre-requisites

- IPv4 connectivity
- direct and reverse DNS for the managed network
- Internet access HTTP (port 80) open
- operator access to routers on OSPF or ISIS network
- Telnet access to the managed devices
- Juniper and Cisco routers and Linux hosts as seed hosts
- **Optional:** SSH access to the managed devices
- **Optional:** SNMP v1 or v2c read-only access to the managed devices
- **Recommended:** Syslog feed from the managed network
- **Recommended:** SNMP traps feed from the managed network

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Installation guide

Note: Download locations for the install/trial NG-NetMS are located on the SourceForge site (http://ngnms.surceforge.net) and http://www.opt-net.eu/products, both of which may be used concurrently.

Download installation image on LiveCD and boot your system from it.
This is possible in one of the following ways:

1. Make a bootable DVD by burning it with your favorite tool;
2. Copy it onto the Flash drive of appropriate size (2GB or larger) with binary file duplication utility and then boot your workstation or server from it;
3. Create a new VM by booting directly from the .iso image.

The last one is by far the easiest and will run in the Cloud, but the first two options will give you your own server, the one you can control and even switch it off or take it home with you.

Note: Few important explanations are due. The LiveCD image of Ubuntu 14.04 LTS that we provide comes without SSH support and with unconfigured SNMP and mailer utilities. MIB files are provided for convenience only. Any enterprise MIBs used are the property of their respective owners. Up-to date copies of these MIBs may be obtained from the web site of telecom equipment vendors.

1. Installing from bootable DVD

This is the classic and most straightforward method of trying or installing NG-NetMS. Simply write the provided liveCD .iso image to the (re)-writable DVD disk with your favorite disk burning software. The .iso image is bootable, so you will be ready to experience NG-NetMS as soon as your disk finished burning.
Just boot your PC from this DVD.

A. Select “Try Ubuntu” if you want to try NG-NetMS without installing it on your PC. Ubuntu will load itself and NG-NetMS into RAM disk and you will be able to try all functions without any hassle.

B. Alternatively, select “Install Ubuntu” if you want to create a permanent install of the NG-NetMS on your hard drive. Make sure you do not erase any valuable partitions once doing so. This will perform normal install of the operating system on your PC.

After system restarts, the login prompt for user **ngnms** would appear.
The initial password is: **optoss**
Start Firefox browser and point your page to ngnms.local URL.
The administrator's login is: **ngnms**
The initial password is: **optoss**

You are ready to test all functions of the NG-NetMS. Please, see User Guide for information about how to use NG-NetMS as administrator.

If you selected "Try Ubuntu", just shutdown the instance once you are done testing and it will disappear without a trace from you system.

2. Installing from bootable Flash drive

This is the most universal method for trying or installing NG-NetMS on your system. It is also one of the most complex methods and will take longest time to prepare, but is quick to boot and run on real PC hardware later.

First, you need to create the startup Flash drive. Get the Flash disk of at least 6GB in size. Please, note that not every USB drive is suitable for this task. Some older devices are not supported by the drivers in Linux.

Use one of the methods below to prepare your bootable stick.
Create one boot and one persistent partition of at least 4GB.

Windows:
Use Universal USB Installer which is free software.

MacOS X (and any other unix based system):
1.) Plug in your USB block device and then use the following command to see which disk node it's located on:

```
sudo diskutil list
```

3.) Unmount the disk where "N" is the number of the disk taken from the above command:

```
diskutil unmountDisk /dev/diskN
```

If the above command was successful, you will see:

```
Unmount of all volumes on diskN was successful
```

4.) Use the ‘dd’ command to copy the image file (.iso) to the particular partition of the disk with (N is the disk number and P is the partition number):

```
dd if=myPartitionImage.dd of=/dev/diskNsP
```

Linux Ubuntu:

Startup Disk Creator - this software is part of the Ubuntu-10.04LTS distribution. It is very easy to use and is more robust than manual disk preparation.

Select the .iso image and reserve the remaining space for persisted storage of the files and settings. On 6GB Flash drive this will result in ~1.2GB in boot partition and 4.8GB for persisted partition.

Alternatively, you may use manual process similar to MacOS X except that it is not required to un-mount the drive before using the ‘dd’ command and the commands differ a little bit.
For example, use “fdisk -l”, your device node would be located at “/dev/sda” and the un-mount command is “umount”.

After system restarts, the login prompt for user **ngnms** would appear.
The initial password is: **optoss**

Start Firefox browser and point your page to ngnms.local URL.
The administrator’s login is: **ngnms**
The initial password is: **optoss**

You are ready to test all functions of the NG-NetMS. Please, see User Guide for information about how to use NG-NetMS as administrator.

If you selected “Try Ubuntu”, just shutdown the instance once you are done testing and it will disappear without a trace from you system.

3. Installing as VM

This is by far the quickest way to start evaluating and using the NG-NetMS if you have a working hypervisor and server running.
Just create a New VM and specify the downloaded .iso file as your boot image.
In the new VM settings ensure that you have allocated at least 1GB of RAM (absolute minimum), enable support of hypervisor applications via Intel VT-x/EPT and code

profiling applications. Also, disable 3D acceleration for this VM if it is available (at this time it is not needed).

The minimum recommended configuration of the VM is at least 2GB of RAM and 2 CPU cores, 20GB of storage space.

Select “Install Ubuntu” once initial boot completes and your are presented with selection to “Try Ubunty” or “Install Ubuntu”. Select “Install Ubuntu” at this time.

Note: if the system is going to be used for management of the medium or larger networks, we recommend to change your partitions during installation process. It is important to allocate separate partitions to /temp and to /home in order to create a stable environment which is resilient to disk overflow conditions that could not be avoided in time.

Example of the disk partitioning scheme for small lab network prolonged use:

```
Filesystem  Size  Used Avail Use% Mounted on
/dev/sda1           46G   5.6G   38G  13% /
none        4.0K  0     4.0K   0% /sys/fs/cgroup
udev        2.0G  4.0K  2.0G   1% /dev
tmpfs       396M  1.2M  395M   1% /run
none        5.0M  0     5.0M   0% /run/lock
none        2.0G  156K  2.0G   1% /run/shm
none        100M  76K   100M   1% /run/user
/dev/sda6           15G   992M   13G   8% /home
/dev/sda5   1.9G  3.9M  1.8G   1% /tmp
```

The installation of Ubuntu and NG-NetMS would start automatically.
After system reboot, the login prompt for user **ngnms** would appear.
The initial password is: **optoss**

All required packages and config settings for NG-NetMS are already configured to give your the first impression about the system.

Note:
ngnms user has sudo privileges, so you may do anything you like with the system after initial installation is done.

It is good idea to install your favorite VM tools and drivers at this time. The operating system is generic Ubuntu 14.04 LTS, so everything you know about it will work. Please, follow your hypervisor system documentation to complete these tasks.

4. Manual installation from the tar.gz archive

IMPORTANT: If you downloaded LiveCD .iso or VM image .ovf files for NG-NetMS, you do not have to follow the instructions in this section. These tasks had been done for you by us already.

The manual process is simple but tedious work which can take several hours to complete, especially if your internet connection is slow. Basic knowledge of linux administration is required to complete all tasks. This can be very frustrating experience for the beginners, and we recommend to use the LiveCD .iso image or .ovf image with pre-configured system for the impatient.

Often, our users require to install the NG-NetMS on the existing server. Please, follow the detailed step by step instructions for the installation of all prerequisites and basic configuration of the system.

For practical reasons, this installation manual describes installation tasks for **Ubuntu 14.04 LTS.**

Note: before continuation of the installation, it is a good time to update and upgrade your core systems. This may be achieved by running following commands:

```
sudo apt-get update
sudo apt-get dist-upgrade
sudo apt-get upgrade
```

Download the NG-netMS_rel_3.4.tar file into your admin user home directory and untar it by running commands:

First:

```
curl http://sourceforge.net/projects/ngnms/files/NG-netMS_rel_3.4.tar/download

then curl the actual link displayed and redirect it to the local file
/tmp/NG-netMS_rel_3.4.tar

cd /tmp
tar xvf NG-netMS_rel_3.4.tar
```

4.1 Install mandatory and optional packages

Note: use apt-get options -q and -y on the newly installed system only. On the existing system mind your existing configuration before overwriting it.

```
sudo apt-get install cmake g++
sudo apt-get -y install postgresql
sudo apt-get -y install postgresql-client
sudo apt-get -y install postgresql-contrib
sudo apt-get -y install php5
sudo apt-get -y install php5-pgsql
sudo apt-get -y install php-net-ipv4
sudo apt-get -y install php5-gd
sudo apt-get -y install php5-curl
sudo apt-get -y install php5-xmlrpc
sudo apt-get -y install php5-xdebug
sudo apt-get -y install php5-geoip
sudo apt-get -y install php5-mcrypt
sudo apt-get -y install php5-redis
sudo apt-get -y install php5-memcache
sudo apt-get -y install php5-memcached
sudo apt-get install libboost-system1.55.0
sudo apt-get install libboost-filesystem1.55.0
sudo apt-get -y install libpqxx-4.0
sudo apt-get -y install libcrypto++9
sudo apt-get -y install libdbi-perl
sudo apt-get -y install libnet-snmp-perl
sudo apt-get -y install libnet-dns-perl
sudo apt-get -y install libconfig-general-perl
sudo apt-get -y install libdatetime-perl
sudo apt-get -y install libxml-sax-perl
sudo apt-get -y install libdatetime-format-strptime-perl
sudo apt-get -y install libnet-telnet-cisco-perl
sudo apt-get -y install libnet-openssh-perl
sudo apt-get -y install libdbd-pg-perl
sudo apt-get -y install libschedule-cron-perl
sudo apt-get -y install libnet-netmask-perl
sudo apt-get -y install libnet-appliance-session-perl

sudo apt-get -y install snmp
sudo apt-get -y install snmpd
sudo apt-get -y install nmap

sudo apt-get install snmp-mibs-downloader (OPTIONAL STEP)
sudo apt-get install mailutils (OPTIONAL STEP)
sudo apt-get install postfix (OPTIONAL STEP)
```

4.2. Install PERL CPAN modules

Upgrade the CPAN installation first. It is also recommended to upgrade all CPAN packages if you have time. But this is optional step.

```
sudo -i
perl -MCPAN -e shell
install CPAN
reload CPAN
upgrade
exit
```

Continue by adding required modules.

```
sudo perl -MCPAN -e 'install Crypt::TripleDES'
sudo perl -MCPAN -e 'install Config::Crontab'
sudo perl -MCPAN -e 'install JSON::Parse'
sudo perl -MCPAN -e 'install Nmap::Scanner'
sudo perl -MCPAN -e 'install Net::IPv4Addr'
sudo perl -MCPAN -e 'install DateTime::Format::Strptime'
sudo perl -MCPAN -e 'install Sort::Key::IPv4'

apply our patches
sudo cp -f /tmp/Patches/Perl/PPDES.pm /usr/local/share/perl/5.18.2/Crypt/
```

4.3 Create SYSTEM user (if not done yet)

```
sudo useradd -m ngnms
sudo echo -e "optoss\noptoss\n" | sudo passwd ngnms  #<-- change password here
sudo usermod -a -G sudo ngnms
```

4.4 Extend /etc/environment with following variables

sudo -i

```
echo 'NGNMS_HOME="/home/ngnms/NGREADY"' >> /etc/environment
echo 'NGNMS_CONFIGS="/home/ngnms/NGREADY/configs"' >> /etc/environment
echo
'PERL5LIB="/home/ngnms/NGREADY/bin:/home/ngnms/NGREADY/lib:/home/ngnms/NGREADY/
lib/Net"' >> /etc/environment
echo 'MIBDIRS="/home/ngnms/NGREADY/mibs"' >> /etc/environment
echo 'NGNMS_CONFIGS="/home/ngnms/NGREADY/configs"' >> /etc/environment
exit
```

4.5 Create Postgress user & database

```
su -l ngnms
```

continue as ngnms user from now on.

```
sudo pg_createcluster 9.3 ngnms
sudo -u postgres psql -c "CREATE USER ngnms CREATEDB LOGIN;"
sudo -u postgres psql -c "ALTER USER ngnms PASSWORD 'ngnms';"
sudo -u postgres psql -c "CREATE DATABASE ngnms;"
sudo -u postgres psql -c "ALTER DATABASE ngnms OWNER TO ngnms;"
```

```
sudo -u postgres psql -c "ALTER DATABASE ngnms SET synchronous_commit = off;"
sudo sed -i '1i host all all 127.0.0.1/32 trust'
/etc/postgresql/9.3/ngnms/pg_hba.conf
```

4.6 Install Backoffice

```
mkdir ~ngnms/NGREADY
cp -rf /tmp/Backoffice/* ~ngnms/NGREADY/
sudo cp -rf /tmp/UpStart/* /etc/init/

sudo touch /var/log/audit.log
sudo chown ngnms /var/log/audit.log
sudo chgrp ngnms /var/log/audit.log

tar xvfz /tmp/DB/ngnms.sql.tar.gz
psql -f ngnms.sql ngnms
```

4.7 Install Web

```
sudo mkdir /var/www/html/htdocs
sudo chmod 755 /var/www/html/htdocs
sudo chown ngnms:ngnms /var/www/html/htdocs
cp -rf /tmp/Web/* /var/www/html/htdocs/
tar xvfz /tmp/YII/yii-1.1.16.bca042.tar.gz
sudo cp -rf yii-1.1.16.bca042/* /var/www/html

sudo cp -f /tmp/Configs/PHP5/mcrypt.ini /etc/php5/mods-available/
sudo ln -s /etc/php5/mods-available/mcrypt.ini
/etc/php5/cli/conf.d/20-mcrypt.ini
sudo ln -s /etc/php5/mods-available/mcrypt.ini
/etc/php5/apache2/conf.d/20-mcrypt.ini

Change APACHE_RUN_USER and APACHE_RUN_GROUP in /etc/apache2/envvars to ngnms

sudo -i
sudo echo "ServerName \"ngnms.local\"" >> /etc/apache2/apache2.conf
sudo cp /tmp/Configs/Apache/ngnms.local.conf /etc/apache2/sites-available
sudo a2dissite 000-default.conf
sudo a2dissite 000-default.conf
sudo a2ensite ngnms.local.conf
sudo echo "127.0.0.1 ngnms_new.local" >> /etc/hosts
sudo chmod -R 775 /var/www/html/htdocs/assets
sudo chmod -R 775 /var/www/html/htdocs/protected
sudo service apache2 restart
exit
```

4.8 Configure snmpd

```
sudo cp -f /tmp/Configs/SNMP/snmpd.conf /etc/snmp/snmpd.conf
```

```
sudo cp -f /tmp/Configs/SNMP/snmp.conf /etc/snmp/snmp.conf
sudo cp -f /tmp/Configs/SNMP/snmptrapd.conf /etc/snmp/snmptrapd.conf
sudo cp -f /tmp/Configs/SNMP/snmpd /etc/default/snmpd
sudo service snmpd restart
```

4.9. Configure Syslog

```
sudo cp -f /tmp/Configs/Rsyslog/rsyslog.conf /etc/rsyslog.conf
```

4.10 Configure SSH (OPTIONAL)

```
By default the LiveCD install disk builds a hardened system. Enable SSH if
needed.
Alternatively the .OVF image of the server comes with SSH pre-installed.

sudo cp -f /tmp/Configs/SSH/ssh_config /etc/ssh/ssh_config
```

4.10 Remove G++ (OPTIONAL)

```
If you want to harden the system or if it was already hardened before, it is a
good idea to remove g++ after installation. Since it is no longer needed to
compile Perl modules. If so, do this now:

sudo apt-get remove g++
```

Note: NG-NetMS may be installed on other systems and we are aware of the successful ports to Debian and FreeBSD. You may be able to install the product on the other systems too. Please, share your experience with us. If you would like to join our project and assist with writing automated packages for different systems, please contact with us through the Discussion Forum on Sourceforge or via e-mail: info@opt-net.eu

Optional configuration steps

Adding SNMP MIBS

NG-NetMS needs SNMP for automatic recognition of the devices and for processing of the incoming SNMP Alarms.
The MIBs could be located at ~/NGREADY/mibs directory.
Just download the necessary MIBs and place the unzipped files there.
Make sure that all required dependencies are resolved.
The system will start using new MIBs automatically after the manual reload of the collectors or after system restart.

Note: in the case if “Try Ubunty” method was selected, the downloaded MIBs will disappear after system reboot.

Adding SSH

Add OpenSSH server with apt-get utility.

```
sudo apt-get install openssh-server
```

Post Install Settings for the managed environment

Network

IP Addressing

NG-NetMS supports only IPv4 addresses at this time. You will need routable IPv4 network through which the devices could be reached by NG-NetMS host. This tool relies on ISIS or OSPF topologies for network discovery. Telnet or SSH access to the network devices is mandatory. Also, the tool needs internet connectivity with unrestricted web access for use of the cloud analytics and access to security patches and other resources.

IMPORTANT: By default, NG-NetMS is secure enough to be placed on public internet, as long as login passwords for root and ngnms accounts are changed by the user from default values. Please, adhere to your organization's security standards and policies. Opt/Net can not be held liable for any security incidents which derive from improper configuration of the user accounts and access policies. We recommend to place NG-NetMS behind the firewall with strict access restrictions. Direct access from the Internet should be disallowed.
Guard it as the rest of your infrastructure!

NG-NetMS may be used in private VPN and private Cloud network configurations, but use of NAT between managed devices and the tool is not recommended.
In the case if there are firewalls, NAT devices or application gateways in between the managed devices and NG-NetMS tool, the special policies will be required to permit telnet, ssh and SNMP GET requests towards devices and reverse policies. In particular, special care should be taken to allow asynchronous and unsolicited syslog and SNMP alarms from managed network to reach NG-NetMS tool.

Ideal placement for NG-NetMS tool is on Operations and Maintenance network (OAM) inside of the managed network.

DNS Settings

The managed network should have proper configuration for direct and reverse DNS resolution. NG-NetMS relies on proper DNS mappings between router and interface DNS names and IP addresses.
In the case of OSPF networks the tool may work without DNS, but use of DNS is recommended. For ISIS networks the hostname or the router should point to its Router ID (IPv4 address), otherwise the NG-NetMS would not be able to discover such devices.
Typically, the Loopback 0 interface may be used for this purpose.

Login settings

NG-NetMS supports Telnet access method out of the box. SSHv1 and SSHv2 are also available out of the box but require manual creation in order to be used.
See more on this is in User Guide.

Syslog redirection

All managed devices should be configured to send the syslog to the remote host i.e. directly routable IP address of NG-NetMS.
Use of NAT devices and Application Level Gateways (ALG firewalls) between the managed network and NG-NetMS is not recommended due to necessity of special firewall and NAT policies.

Redirection of syslog may be achieved with one of the following commands:

Juniper routers and switches (JUNOS):

```
> show configuration system syslog
archive size 500k files 5;

host 192.168.3.110 {
    any info;
}
host 192.168.3.117 {
    any info;
    source-address 192.168.255.1;
}
```

Juniper SRX firewalls (JONOS):

```
set security log mode stream
set security log source-address 192.168.255.1
set security log stream LAB-120 severity info
set security log stream LAB-120 format syslog
set security log stream LAB-120 category all
```

```
set security log stream LAB-120 host 192.168.3.120
set security log stream LAB-120 host port 514
```

Cisco routers (IOS):

```
logging trap informational
logging source-interface Loopback0
logging 192.168.3.117
logging on
```

SNMP settings and redirection

All managed devices should be configured to send the SNMP Alarms to the remote host i.e. directrly routable IP address of NG-NetMS.
Use of NAT devices and Application Level Gateways (ALG firewalls) between the managed network and NG-NetMS is not recommended due to necessity of special firewall and NAT policies for unsolicited UDP packets from routers and switches.

Setting destination for SNMP Alarms may be achieved with one of the following commands:

Juniper routers and switches (JUNOS):

```
> show configuration snmp
...
community public {
    authorization read-only;
    clients {
        192.168.3.0/24;
        0.0.0.0/0 restrict;
        192.168.2.0/24;
    }
}
trap-options {
    source-address 192.168.255.1;
}
trap-group public {
    version v2;
    targets {
        192.168.3.110;
        192.168.3.117;
        192.168.3.107;
    }
}
...
```

Cisco routers (IOS):

```
snmp-server community public RO
snmp-server trap-source Loopback0
snmp-server enable traps snmp authentication linkdown linkup coldstart warmstart
snmp-server enable traps tty
snmp-server enable traps hsrp
snmp-server enable traps config
snmp-server enable traps entity
snmp-server enable traps bgp
snmp-server enable traps ipmulticast
snmp-server enable traps msdp
snmp-server enable traps rsvp
snmp-server enable traps frame-relay
snmp-server enable traps rtr
snmp-server enable traps dlsw
snmp-server enable traps dial
snmp-server enable traps voice poor-qov
snmp-server host 192.168.3.107 version 2c public
snmp-server host 192.168.3.110 version 2c public
```

NG-NetMS host

IP Addressing

NG-NetMS needs at least 1 routable IP address to function normally.
This IP address may be obtained via DHCP or configured manually.
The web server will bind to this interface and local and remote users may connect to the web GUI after authentication.

DNS Settings
NG-NetMS needs properly configured DNS in the case if managed network is based on ISIS protocol. Both forward and reverse DNS records should point to the Router ID.
For example:
Router's Fully Qualified Domain name (FQDN) is CUST-PE-01a.opt-net.eu
The router id is 10.1.0.1 and it is assigned to Loopback 0 interface.
In this case the DNS A record for 10.1.0.1 on the server should point to CUST-PE-01a as in example below:

```
$TTL 3600                               ; default TTL to 1 hour

opt-net.eu.   IN     SOA    ns1.opt-net.eu. admin.opt-net.eu. (
                            201303141258 ; serial number
                            10800        ; refresh
                            3600         ; retry
```

```
                          604800       ; expire
                          300          ; negative response TTL
                          )

; DNS Server
             IN     NS     ns1.opt-net.eu.

; Hosts

ns1          IN     A      10.1.101.11
CUST-PE-01a  IN     A      10.1.0.1
CUST-PE-01b  IN     A      10.1.0.2
```

DNS PTR record for IN-ADDR.ARPA.EU.OPT-NET.CUST-PE-01a is as follows:

```
$TTL   3600               ; default TTL to 1 hour

0.1.10.in-addr.arpa.      IN SOA ns1.opt-net.eu. admin.opt-net.eu. (
                          201303141702 ; serial
                          10800        ; refresh
                          3600         ; retry
                          604800       ; expire
                          300          ; negative response TTL
                          )

       IN     NS     ns1.opt-net.eu.

; Hosts

1      IN     PTR    CUST-PE-01a.opt-net.eu.
2      IN     PTR    CUST-PE-01b.opt-net.eu.
```

and domain suffix lookup should contain opt-net.eu in the domain and search list on the NG-NetMS host as in example below:

```
domain opt-net.eu
search opt-net.eu
```

Login settings

The LiveCD does not allow any logins to the NG-NetMS out of the box. Please, install OpenSSH-server and configure your environment.
You might want to generate your SSH keys, which you may use for logins to your network devices. These tasks are left intentionally for the user.
Please, follow operating system documentation to complete these tasks.

The NG-NetMS User manual will assume that SSH is fully configured and functional for description of the login configuration.

Syslog redirection

NG-NetMS arrives with pre-configured event collector which is ready to accept all incoming syslog messages via UDP port 514 by default. You may change this configuration from defaults by modifying startup scripts of by stopping and relaunching collectors manually.

SNMP settings and redirection

NG-NetMS relies on Net-SNMP package for SNMP processing.
It arrives with pre-configured event collector which is ready to accept all incoming SNMP Alarms. All alarms are funneled via snmptrapd which listens via UDP on port 162 by default. You may change this configuration from defaults by modifying startup scripts for snmptrapd and by stopping and relaunching collectors manually.

Final Word from Opt/Net

This document should get you to the point when NG-NetMS is up and running.
You may get more information about how to configure and run web GUI in the User Guide.

If you want to contribute to this guide, we will be delighted to have you in our team. Please, contact us via NG-NetMS project website on SourceForge

https://sourceforge.net/projects/ngnms/